Outline for Today
Friday, Sept. 28

- Chapter 4: Aqueous Reactions and Solution Stoichiometry
  - Precipitation Reactions
  - Acid-Base Reactions
  - Reduction-Oxidation Reactions

On your note card, take 2 minutes to write:

- Name
- What are **two** different ways you will **study** for the exam on **Monday**?
- What is one topic that you **feel good about** for the exam?
- What is **one challenging topic** that you will focus on while studying for the exam?

Table 4.1 Solubility Guidelines for Common Ionic Compounds in Water

Soluble Ionic Compounds		Important Exceptions
Compounds containing	NO_3^-	None
	CH_3COO^-	None
	Cl^-	Compounds of Ag^+, Hg_2^{2+}, and Pb^{2+}
	Br^-	Compounds of Ag^+, Hg_2^{2+}, and Pb^{2+}
	I^-	Compounds of Ag^+, Hg_2^{2+}, and Pb^{2+}
	SO_4^{2-}	Compounds of Sr^{2+}, Ba^{2+}, Hg_2^{2+}, and Pb^{2+}
Insoluble Ionic Compounds		**Important Exceptions**
Compounds containing	S^{2-}	Compounds of NH_4^+, the alkali metal cations, Ca^{2+}, Sr^{2+}, and Ba^{2+}
	CO_3^{2-}	Compounds of NH_4^+ and the alkali metal cations
	PO_4^{3-}	Compounds of NH_4^+ and the alkali metal cations
	OH^-	Compounds of NH_4^+, the alkali metal cations, Ca^{2+}, Sr^{2+}, and Ba^{2+}

Solubility Rules

- Compounds containing the following are **soluble**:

Cation	Exception
Alkali Metals (Group 1A)	None
NH_4^+	None

From Table 4.1

Anion	Exceptions
NO_3^-	None
CH_3COO^-	None
Cl^-	With Ag^{2+}, Hg_2^{2+}, Pb^{2+}
Br^-	With Ag^{2+}, Hg_2^{2+}, Pb^{2+}
I^-	With Ag^{2+}, Hg_2^{2+}, Pb^{2+}
SO_4^{2-}	With Sr^{2+}, Ba^{2+}, Hg_2^{2+}, Pb^{2+}

Solubility Rules

- Compounds containing the following are **NOT soluble:**

Anion	Exceptions
S^{2-}	With NH_4^+, alkali cations, Ca^{2+}, Sr^{2+}, Ba^{2+}
OH^-	With NH_4^+, alkali cations, Ca^{2+}, Sr^{2+}, Ba^{2+}
CO_3^{2-}	With NH_4^+, alkali cations
PO_4^{3-}	With NH_4^+, alkali cations

From Table 4.1

Memorize Table 4.2

Table 4.2 Common Strong Acids and Bases

Strong Acids	Strong Bases
Hydrochloric acid, HCl	Group 1A metal hydroxides [LiOH, NaOH, KOH, RbOH, CsOH]
Hydrobromic acid, HBr	
Hydroiodic acid, HI	Heavy group 2A metal hydroxides [$Ca(OH)_2$, $Sr(OH)_2$, $Ba(OH)_2$]
Chloric acid, $HClO_3$	
Perchloric acid, $HClO_4$	
Nitric acid, HNO_3	
Sulfuric acid (first proton), H_2SO_4	

Determining Oxidation Numbers

1. Atoms in elemental form: Oxidation number is zero.

2. Monoatomic ion: Oxidation number equals the charge.

3. Oxygen: Usually -2

4. Hydrogen: bonded to nonmetal, usually +1; bonded to metals, usually -1

5. Fluorine: Always -1

6. Other Halogens: Usually -1. Bonded to Oxygen?

7. sum of oxidation numbers for neutral compound is zero, some for polyatomic ion is charge of ion.

Determining Oxidation Numbers

Species	Oxidation Number
Elemental Atoms	0
Monoatomic Ion	Charge on Ion
Hydrogen Bonded to Nonmetal	+1
Hydrogen Bonded to Metal	-1
Oxygen	Usually -2
Fluorine	-1
Other Halogens	Usually -1
Neutral Molecule	Sum of Oxidation Numbers is 0
Polyatomic Ion	Sum of Oxidation Numbers is Ion charge